

## Category 3 Streams

*Small secondary streams that have potential for kokanee spawning.*

- George Davis Creek
- Idylwood Creek
- Schneider Creek
- Vasa (Squibbs) Creek
- Zaccuse Creek

### George Davis Creek

George Davis Creek (WRIA #08.0144) is currently not considered a critical spawning stream for kokanee (Figure 15). Kokanee spawners have intermittently returned to the accessible portion of the creek following a recent restoration project of the lower reach (Figure 16). However, a habitat assessment and spawner monitoring effort is needed before the KWG can reach a conclusive decision on the stream's overall potential as a kokanee spawning stream and whether it can support a self-sustaining kokanee spawning aggregation.

The mouth of George Davis Creek is along the east shoreline of Lake Sammamish and is located about 0.25 miles northeast of the mouth of Zaccuse Creek. The stream is within the City of Sammamish. Only about 100 feet of George Davis Creek is currently accessible to kokanee and provides potential spawning habitat. The stream flows through a culvert/vault upstream of the accessible reach, preventing further upstream migration of kokanee. The stream is relatively small and there are few holding pools for adult kokanee. Land use along the inaccessible stream reaches is a mix of residential development and intact green space.

At this time, pending further assessment of the creek, there is no further suggested restoration project for kokanee in George Davis Creek. An assessment of habitat conditions throughout George Davis Creek is needed before any proposal is added to the list of kokanee restoration projects. The currently accessible reach was restored by The Watershed Company in 2009 (<http://www.watershedco.com/shorelines/lksamm-res.php>). The major restoration efforts would involve replacing culverts under King County's East Lake Sammamish Trail and the City of Sammamish's East Lake Sammamish Parkway. However, this would be an expensive project and the amount of habitat that would become available to kokanee is currently not known.

Adult kokanee have occasionally been observed in George Davis Creek since 2009 and use there has generally been monitored by the landowner at the stream mouth. However, there has not

been any focused agency effort to monitor adult kokanee abundance in George Davis Creek due to the program emphasis on the primary spawning streams. In some years, several adult kokanee have been observed to move into the creek at night and then leave the next day. In 2012, a peak of 15 kokanee was observed in George Davis Creek and they appeared to be actively spawning in the stream.



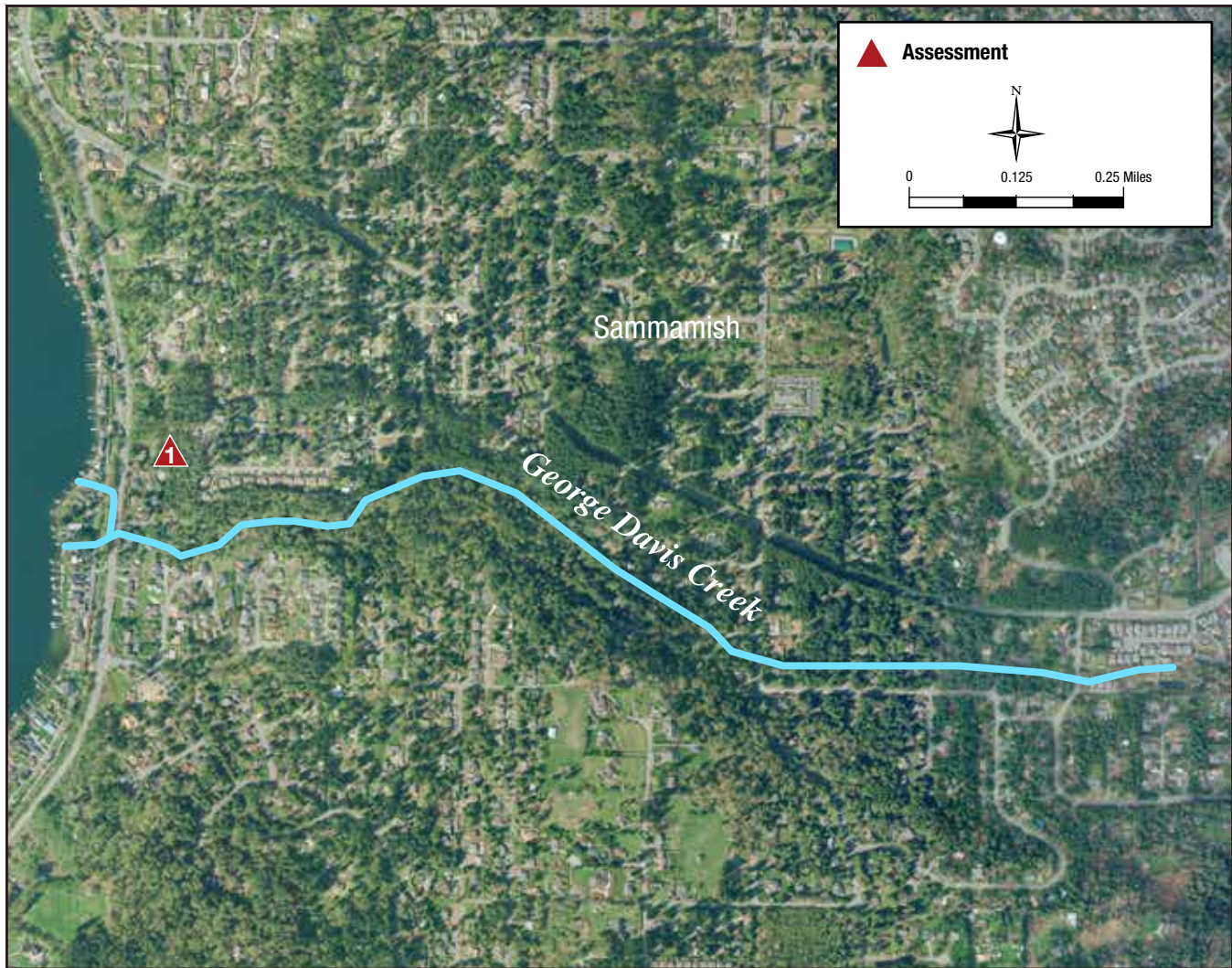


Figure 15. Location of identified restoration/enhancement projects on George Davis Creek.



Figure 16. Kokanee spawning reach (looking upstream and downstream) in George Davis Creek, December 2012. As a point of reference, the wooden plank over the stream can be seen in both photographs (photo credit: Roger Tabor, USFWS).



## Project Associated with George Davis Creek

(Potential timeline is given in Table 11)

**▲ George Davis Creek Habitat Assessment** – Assess habitat conditions to determine the potential for kokanee to be self-sustaining in George Davis Creek.

- Estimated Project Cost: \$35,000
- Funds Acquired: \$0
- Funds Needed: \$35,000
- Estimated Project Duration (planning & design): Three months
- Estimated Project Duration (assessment): one year
- Current or Potential Project Lead: City of Sammamish

## George Davis Team Members:

Don Gerend, Tom Odell, Eric Lafrance (City of Sammamish); Matt Baerwalde (Snoqualmie Tribe); Jeff Chan, Brad Thompson, Paul Bakke (USFWS); Erica Tiliacos (Save Lake Sammamish); and Mark Taylor (Trout Unlimited)

George Davis	2013	2014	2015	2016	2017	2018	2019	2020	2021
Project #									
▲									

Table 11. Potential timeline for kokanee restoration project in George Davis Creek.

▲ Assessment

● Planning

● Implementation

## Idylwood Creek

Idylwood Creek (WRIA #08.0143) is a small creek in the northwest corner of the Lake Sammamish basin that currently does not support a significant number of kokanee spawners. Before 2012, adult kokanee had rarely been observed to use Idylwood Creek; however, there had been little effort to monitor their abundance in this creek. In November-December 2012, several kokanee were observed spawning in this creek with a peak count of approximately 25 fish.

The mouth of Idylwood Creek is on the northwest shoreline of Lake Sammamish, about 0.6 miles south of the outlet of the

lake to the Sammamish River. The lower part of the Idylwood Creek watershed is located in the City of Redmond, while the headwaters are in the City of Bellevue (Figure 17). Land use along most of the stream and throughout the watershed consists of residential development. A bypass pipeline takes high flows from above 172nd Avenue NE and NE 28th Street to West Lake Sammamish Parkway to help reduce the impacts of high-flow events. Restoration of the stream reach between 172nd Avenue NE and NE 28th Street to West Lake Sammamish Parkway was completed in 2005 and consisted of installation of log weirs, substrate enhancement, and riparian plantings. The culverts

under West Lake Sammamish Parkway and NE 36th St have also been modified to improve fish passage.

The lower 800 feet of Idylwood Creek is within the Idylwood Beach Park (City of Redmond) and is where all kokanee spawning activity was observed in 2012. Immediately downstream of West Lake Sammamish Parkway there are a series of concrete weirs that may be a partial barrier to kokanee moving upstream (Figure 18). In 2012, most kokanee were below the weirs while a few were in between the weirs (Figure 19). Because stream reaches upstream of West Lake Sammamish Parkway were





Figure 17. Location of identified restoration/enhancement projects on Idylwood Creek.



not surveyed, it is unclear if kokanee were able to migrate past the concrete weirs below the parkway. A restoration project (log weir installation and riparian plantings) of the Idylwood Beach Park reach was completed in 2002.

At this time, the only suggested major restoration project for kokanee in Idylwood Creek is a gravel enhancement project for the Idylwood Beach Park reach to improve kokanee spawning success. Maintenance at the high-flow bypass pipeline removes gravel from the headwaters and the lower reaches appear to have little gravel substrate. Additionally, the City of Redmond proposes to remove a logjam just upstream of NE 36th Street near West Lake Sammamish Parkway to improve fish passage. This work will be undertaken by the City of Redmond with minimal cost.

More comprehensive spawning surveys of Idylwood Creek are needed to determine the extent that adult kokanee are using this stream. The City of Redmond is planning to undertake this task with existing staff. A fish passage evaluation of the concrete weirs in Idylwood Beach Park is also needed.



Figure 18. Concrete weirs downstream of West Lake Sammamish Parkway (photo credit: Tom Hardy, City of Redmond).



Figure 19. Idylwood Creek upstream of NE 36th Street (photo credit: Tom Hardy, City of Redmond).

Project Associated with Idylwood Creek

(Potential timeline is given in Table 12)

- 1
- Gravel Enhancement of the Idylwood Beach Park Spawning Reach** – City of Redmond proposes to add gravel to the stream near West Lake Sammamish Parkway to improve kokanee spawning success. All funds are expected to come from the City of Redmond.

  - Estimated Project Cost: \$5,000
  - Funds Acquired: \$0 (City of Redmond)
  - Funds Needed: \$5,000
  - Estimated Project Duration (planning & design): three months
  - Estimated Project Duration (construction): one month
  - Current or Potential Project Lead: City of Redmond

Idylwood	2013	2014	2015	2016	2017	2018	2019	2020	2021
Project #									
1									

Table 12. Potential timeline for kokanee restoration project in Idylwood Creek.



## Idylwood Team Members:

Peter Holte, Roger Dane, Tom Hardy (City of Redmond); Hans Berge (King County); and Roger Tabor (USFWS).

## References

R.W. Beck, Inc. 2001. Idylwood Creek Restoration Design Report. Report of R.W. Beck, Inc. to the City of Redmond, Washington.

## Schneider Creek

Schneider Creek is a small creek that enters Lake Sammamish along its southwestern shoreline and does not support a significant number of kokanee spawners. Adult kokanee were not documented to use Schneider Creek until 2012; however, there has been little focused effort to monitor their abundance in this creek. In 2012, kokanee were observed spawning in this stream and a peak spawner abundance of 12 fish (8 live and 4 dead) was observed on December 11, 2012. All fish were downstream of the West Lake Sammamish Parkway/I-90 culvert.

Schneider Creek (Figure 20) is located within the City of Issaquah. The mouth of Schneider Creek is about 0.12 miles west of the mouth of Tibbetts Creek in the southwest corner of the lake. The lower 440 feet of the stream has a very low gradient with fine substrates and therefore likely does not currently provide any kokanee spawning habitat (Figure 21). This stream section forms the property line between a resi-

dential home to the west and the City of Issaquah's open-space parcel to the east. The next 175 feet of stream habitat runs along West Lake Sammamish Parkway and has a steeper gradient than the lower section (Figure 21). This short stream section is where all spawning activity was observed in 2012.

The culvert under West Lake Sammamish Parkway/I-90 does not appear to be a fish passage barrier. Just upstream of the parkway/I-90 culvert there are two small tributaries or ditches that enter Schneider Creek. There is a short section of about 200 feet of Schneider Creek that runs along I-90 that could provide some spawning habitat but upstream of this, the stream is quite small and may not support kokanee spawning. Also, the stream habitat is severely degraded due to neighboring land use practices (e.g., agricultural activities).

At this time, there is no kokanee restoration project listed for Schneider Creek. An assessment of habitat conditions throughout Schneider Creek is needed before any proposal is added to the list of kokanee restoration projects. One possible project is to move the lower section of the stream to the east so it is entirely located within public lands (Sammamish Cove Park) and restored to maximize kokanee spawning habitat. In addition, the large undeveloped property south of I-90 that Schneider Creek flows through is currently

slated for development into multifamily housing; creek enhancements within a 100-foot buffer will likely be required of the developer as mitigation and could provide considerable kokanee spawning habitat. Further evaluation of these possible projects is needed. Additionally, more comprehensive spawning surveys of Schneider Creek are needed to determine the extent that adult kokanee are using this stream.

## Schneider Team Members:

Kerry Ritland (City of Issaquah) and Roger Tabor (USFWS)





Figure 20. Map of Schneider Creek. The map also shows two ditches that appear to supply some flow to Schneider Creek during the fall and winter. Adult kokanee have been observed only below the West Lake Sammamish Parkway/I-90 culvert.





*Figure 21. Schneider Creek: The left photograph is of the low-gradient reach near the mouth of the creek (photo credit: Rachel Brooks, USFWS; Dec. 16, 2013). The right photograph is of the kokanee spawning reach near the West Lake Sammamish Parkway (photo credit: Roger Tabor, USFWS; December 11, 2012).*

## Vasa (Squibbs) Creek

Vasa Creek (WRIA 08.0156) currently does not support a significant number of kokanee spawners. However, an assessment of habitat conditions and a spawner monitoring effort is needed before the KWG can reach a conclusive decision on the stream's potential as a kokanee spawning stream and support for a self-sustaining kokanee spawning aggregation.

The mouth of Vasa Creek is along the southwest shoreline of Lake Sammamish, just north of Vasa Park (Figure 22), about one mile northwest of

the mouth of Lewis Creek. The stream sub-basin is located in the City of Bellevue. The approximate lower half mile of Vasa Creek is potential spawning habitat with adequate spawning gravels (Figure 23). However, the stream is relatively small (about one quarter the size of Lewis Creek) and there are few holding pools for adult kokanee. Land use along this stream reach is all residential development and the streambed and riparian area are owned by individual landowners. The houses were built prior to environmental regulations, resulting in

reduced riparian vegetation, stream channelization, and bank armoring. Upstream of the lower reach, the stream is steep and quite small and not considered a potential kokanee spawning site. A bypass pipeline taking high flows from just below I-90 directly to Lake Sammamish helps reduce high-flow events in the lower reach.

At this time, there is no suggested restoration project for kokanee in Vasa Creek. An assessment of hydrologic and habitat conditions throughout Vasa Creek is needed before any proposal is added to the list of kokanee restoration projects. The



culvert under West Lake Sammamish Parkway was modified in the late 1990s to allow for improved sediment transport and fish passage. An assessment of the effectiveness of this culvert for fish passage is needed. The City of Bellevue also completed stream stabilization for approximately 800 feet of stream above I-90 in 2011. An assessment of the upper basin of Vasa Creek is needed to determine if anything else needs to be done to maintain stream stability.

Adult kokanee have occasionally been observed in Vasa Creek; however, there has not been any consistent effort to monitor their abundance. Surveys have commonly consisted of spot checks from a bridge along West Lake Sammamish Parkway, augmented by periodic reports from neighboring landowners. In December 2012, the lower reach was surveyed a few times and approximately 15-20 adult kokanee were observed in the creek during each survey. More comprehensive surveys

by USFWS and King County were started in 2013 and are expected to continue.



Figure 22. Vasa Creek (photo credit: Rachel Brooks, Dec. 16, 2013). The left photograph is looking upstream from the mouth. The right photograph was taken just downstream from the West Lake Sammamish Parkway.



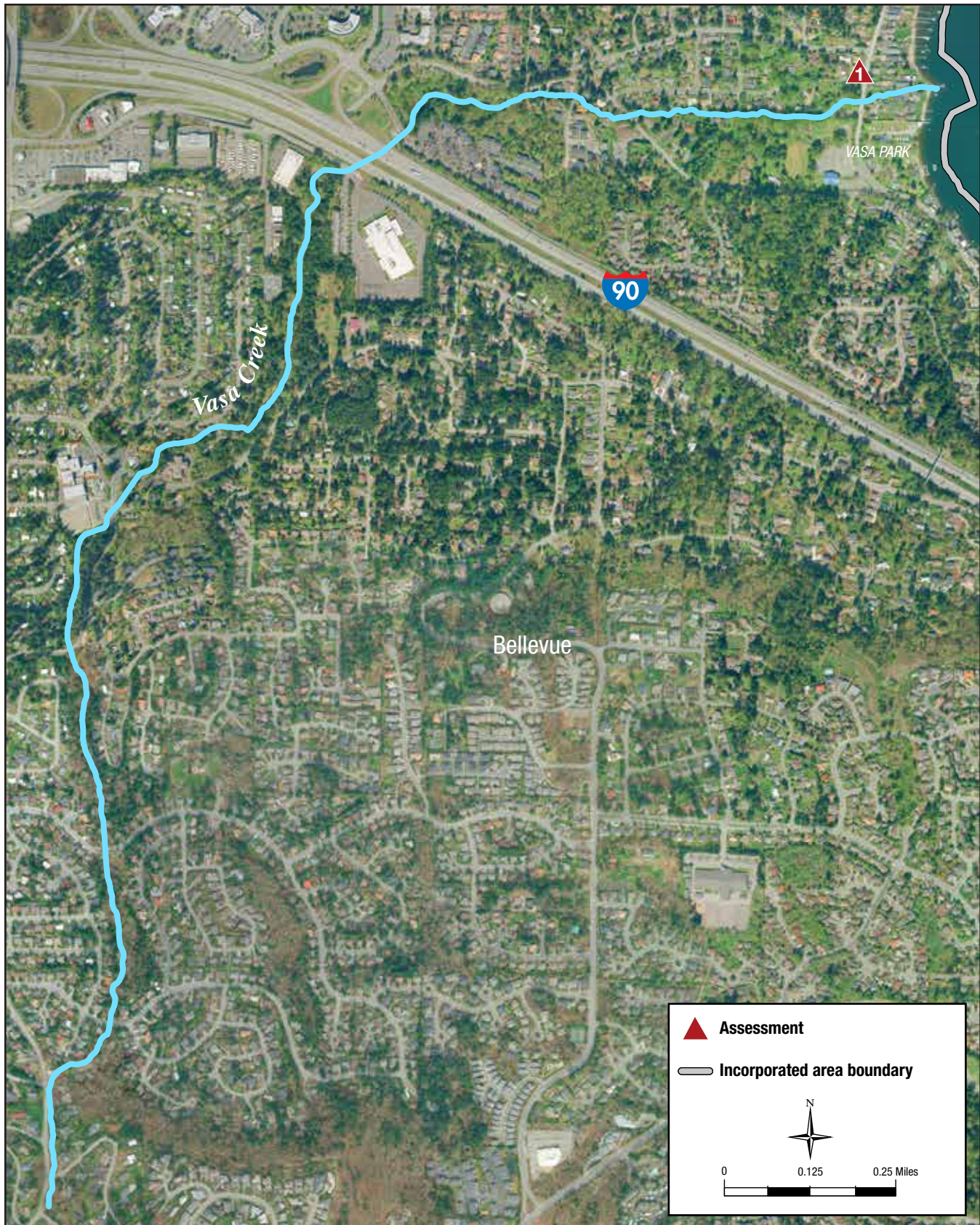


Figure 23. Location of identified restoration/enhancement projects on Vasa Creek.



## Project Associated with Vasa Creek

(Potential timeline is given in Table 13)

### Vasa Creek Hydrologic and Habitat Assessment –

To determine the potential for kokanee in Vasa Creek, an assessment of hydrologic and habitat conditions throughout the basin is needed. The City of Bellevue has initiated these studies, with project planning and flow gauge installation in 2013. Project is anticipated to be completed in 2014.

- Estimated Project Cost: \$50,000
- Funds Acquired: \$50,000
- Funds Needed: \$0
- Estimated Project Duration (planning & design): Six months
- Estimated Project Duration (assessment): 1.5 years
- Current or Potential Project Lead: City of Bellevue

## Lewis and Vasa Team Members:

Kerry Ritland (City of Issaquah); Kit Paulsen, Glenn Kost (City of Bellevue); Kirk Lakey (WDFW); Roger Tabor, Brad Thompson (USFWS); and Hans Berge (King County)




Vasa	2013	2014	2015	2016	2017	2018	2019	2020	2021
Project #									
									

Table 13.— Potential timeline for the kokanee assessment project in Vasa Creek.

 Assessment

 Planning

 Implementation

## Zaccuse Creek

### Goal/Vision

It is our (KWG) intention that by implementing the following projects we will reintroduce kokanee into Zaccuse Creek and promote the establishment of a self-sustaining population through expansion and improvement of the ecological processes that benefit the long-term existence of kokanee and allow natural processes to persist.

Zaccuse Creek (WRIA #08.0148) is on the east side of Lake Sammamish and is located about 500 ft. south

of Lewis Thompson Road in Sammamish. There is little to no urbanization on or immediately adjacent to much of Zaccuse Creek (see Figure 24).

The lower section of Zaccuse Creek has three major culverts that likely impede fish passage under some or all conditions present during the spawning season (Figure 25). Based on results from the 2012-13 spawning season, under certain conditions kokanee currently can migrate past the culverts under East Lake Shore Lane and East Lake Sammamish Trail but not above

the East Lake Sammamish Parkway culvert. The KWG is concerned about the current potential for the two lower culverts to periodically block passage, and about the potential that improvements to the East Lake Sammamish Parkway culvert and habitat upstream of that culvert could create sediment or flow conditions that would impact passage at these culverts in the long term (Table 14). The stream segments upstream of the culverts (approximately 700 ft.) require re-location away from the East Lake Sammamish Parkway road ditch and alteration of channel

morphology to enhance the way the stream transports and retains its sediment load (Figure 25), and the way large wood and sediment interact to create and sustain kokanee spawning habitat. This stream section has the majority of the potential spawning habitat in Zaccuse Creek and is owned by a private citizen (Mr. Walter Pereyra) who is working closely with the KWG. At the eastern edge of Mr. Pereyra's property is a steep stream section where the bed elevation falls 5.2 ft. over a horizontal distance of 17 ft. (Anderson 2012). It is unclear whether kokanee would be able to migrate past this section. Further upstream, a culvert under 206th Ave NE would also be a barrier to kokanee migration.

In recent years, kokanee have rarely been observed in Zaccuse Creek; however, there has not been any consistent effort to monitor their abundance. During the large Lake Sammamish kokanee run in 2012-13, good numbers of spawners were observed in Zaccuse Creek from November to January. The peak count in 2012-13 was approximately 60 kokanee. Because there is currently limited spawning habitat in Zaccuse Creek, it is unclear if most of the kokanee spawned in the creek or moved to another tributary to spawn.

Additional information on Zaccuse Creek can be found in the following reports: Anderson (2012) and King County (2013).



*Zaccuse Creek (photo credit: Glenn Anderson).*





Figure 24. Locations of identified restoration/enhancement projects on Zaccuse Creek.





**1 Looking upstream to culvert** under East Lake Sammamish Shore Lane.



**2 Looking upstream to culvert** under multi-use path. This culvert impedes fish passage due to vertical water drops at both the inlet and outfall, as well as high velocities within the pipe itself during high water streamflows.



**3 Looking downstream at culvert** under East Lake Sammamish Parkway. The stream channel takes a 90° turn into the culvert, which creates problems with sediment transport and debris accumulation. In addition, velocities in this culvert are high during moderate peak flows, and the culvert outfall has a drop that impedes fish passage.



**4 Wetland area directly upstream** from the East Lake Sammamish Parkway, which lacks a well-defined channel.

*Figure 25. Possible restoration sites on Zaccuse Creek (photo credit: Glenn Anderson).*



Zaccuse		● Culvert replacement/modification	■ Stream restoration	● Supplementation/reintroduction
Project #	Project Type	Name of Project	Description	
1	●	Culvert Replacement at East Lake Sammamish Shore Lane	Replace culvert to improve fish passage and natural sediment transport.	
2	●	Culvert Replacement at East Lake Sammamish Trail	Replace culvert to restore fish passage at all flows and restore natural sediment transport.	
3	●	Culvert Replacement at East Lake Sammamish Parkway	Replace culvert to restore fish passage and natural sediment transport.	
4	■	Channel Reconstruction through Wetland	Restore channel through forested wetland.	
5	●	Zaccuse Creek Reintroduction	Supplement or reintroduce kokanee into this creek system.	

*Table 14. List of five identified projects to restore or enhance kokanee fish passage and spawning habitat on Zaccuse Creek. Project numbers indicate relative location on the stream (downstream to upstream) and do not indicate priority or schedule of implementation.*

## Projects Associated with Zaccuse Creek

(In order from the creek mouth to the most upstream; potential timelines are given in Table 15.)

- 1 Culvert Replacement at East Lake Sammamish Shore Lane** – The culvert under East Lake Sammamish Shore Lane may impede kokanee from accessing the watershed upstream of the East Lake Sammamish Parkway and obstruct natural sediment transport. Replacement of the culvert with a much wider one, preferably a “stream simulation” design, in conjunction with replacement of the culverts described in projects 2 and 3, will restore access for kokanee to the upper reaches of this creek and restore more natural sediment transport and channel formation. Depending on the replacement design, additional spawning habitat could also be restored

within the footprint of this crossing. Without the removal or replacement of these three culverts, kokanee will be unable to access the majority of habitat provided by the creek. The project site is approximately 150 ft upstream from the mouth of the creek and 150 ft downstream of the East Lake Sammamish Parkway.

- Estimated Project Cost (planning & design): \$30,000 (50% design) + \$10,000 (90% design) + \$5,000 (final)
- Estimated Project Cost (construction): \$155,000
- Funds Acquired:
- Funds Needed:
- Estimated Project Duration (planning & design):
- Estimated Project Duration (construction):
- Current or Potential Project Lead: King County Department of Natural Resources and Parks in association with East Lake Sammamish Shore Lane homeowners

- 2 Culvert Replacement at East Lake Sammamish Trail** – The culvert under East Lake Sammamish Trail may impede kokanee from accessing upstream spawning grounds and obstruct natural sediment transport. Replacement of the culvert, in conjunction with the culverts described in projects 1 and 3, will restore access for kokanee to the upper reaches of this creek and restore more natural sediment transport and channel formation. Depending on the replacement design, additional spawning habitat could also be restored within the footprint of this crossing. Without the removal or replacement of these three culverts, kokanee will be unable to access the majority of habitat provided by the creek. The project site is approximately 200 ft upstream from the mouth of the creek and 100 ft downstream of the East Lake Sammamish Parkway.

- Estimated Project Cost (planning & design): \$30,000 (50% design) + \$10,000 (90% design) + \$5,000 (final)
- Estimated Project Cost (construction): \$90,000
- Funds Acquired:
- Funds Needed:
- Estimated Project Duration (planning & design):
- Estimated Project Duration (construction):
- Current or Potential Project Lead: King County Department of Natural Resources and Parks

**3 Culvert Replacement at East Lake Sammamish Parkway** – The culvert under East Lake Sammamish Parkway may impede kokanee from accessing upstream spawning grounds and obstruct natural sediment transport. Replacement of the culvert with a much wider one, preferably a “stream simulation” design that has a lower inlet elevation than currently exists, will allow for establishment of a stream bed profile (slope) that allows for improved transport and retention of spawning gravels in the lower reaches of Zaccuse Creek, including the reach immediately upstream of the parkway (Project 4). Depending on the replacement design, additional spawning habitat could also be restored within the footprint of this crossing. If done in conjunction with replacement of the culverts in projects 2 and 3, this action will allow kokanee

access to spawning reaches upstream of the East Lake Sammamish Parkway. The project site is approximately 300 ft upstream from the mouth of the creek.

- Estimated Project Cost (planning & design):
- Estimated Project Cost (construction):
- Funds Acquired:
- Funds Needed:
- Estimated Project Duration (planning & design):
- Estimated Project Duration (construction):
- Current or Potential Project Lead: City of Sammamish

**4 Channel Restoration through Forested Wetland** – The wetland area upstream of the East Lake Sammamish Parkway is a stream segment that historically supported spawning kokanee, but currently does not have channel morphology conducive to maintaining sediment transport, fish passage, or retention of spawning-sized gravels. Reconstruction of the channel will significantly increase the area available for kokanee spawning in Zaccuse Creek. The project site is approximately 1,500 ft upstream of the creek mouth.

- Estimated Project Cost (planning & design):
- Estimated Project Cost (construction):
- Funds Acquired:
- Funds Needed:
- Estimated Project Duration (planning & design):

- Estimated Project Duration (construction):
- Current or Potential Project Lead:

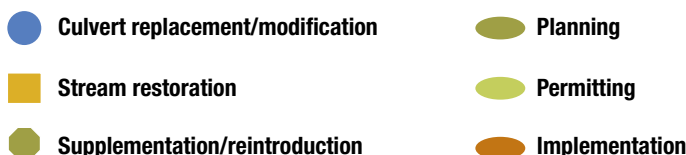
**5 Zaccuse Creek Reintroduction** – The reintroduction of kokanee into Zaccuse Creek using the supplementation program provides an opportunity to “jumpstart” recolonization of the reach upstream of the East Lake Sammamish Parkway. The Issaquah Creek Hatchery will oversee egg incubation and fry rearing for this effort. Cost will vary depending upon availability of recirculating RSI units at the hatchery and any necessary infrastructure upgrades.

- Estimated Project Cost (planning & design): \$36,000 (construction of additional RSI incubator system)
- Estimated Project Cost (implementation): \$18,000/year (operation & maintenance)
- Funds Acquired: None
- Funds Needed: \$36,000 + \$72,000 (four years of operation & maintenance for one kokanee generation) + \$144,000 (eight additional years of operation & maintenance for two additional kokanee generations)
- Estimated Project Duration (planning & design): 45 days
- Estimated Project Duration (implementation): Up to 12 years (may be less, subject to population response)
- Current or Potential Project Lead: WDFW, USFWS, and King County DNR



Zaccuse	2013	2014	2015	2016	2017	2018	2019	2020	2021
Project #									
1									
2									
3									
4									
5									

Table 15. Potential timeline for kokanee restoration projects in Zaccuse Creek. Projects are listed in order from the creek mouth to the most upstream and scheduling is independent for each project.



## Zaccuse, Ebright, and Pine Lake (ZEP) Team Members:

Don Gerend, Tom Odell, Eric Lafrance (City of Sammamish); Wally Pereyra (private landowner); Matt Baerwalde (Snoqualmie Tribe); Jeff Chan, Brad Thompson, Paul Bakke (USFWS); Erica Tiliacos (Save Lake Sammamish); Ilene Stahl (Friends of Pine Lake); and Mark Taylor (Trout Unlimited)

## References

- Anderson, G. S. 2012. Design guidance for culvert replacement projects and possible realignment and re-grading of Zaccuse Creek upstream of the culvert replacement projects. Technical Memorandum of R2 Resource Consultants, Inc., Redmond, Washington to Walter T. Pereyra.
- King County. 2013. Kokanee and Chinook restoration projects, Sammamish Watershed. <http://www.kingcounty.gov/environment/animalsAndPlants/restoration-projects/kokanee-chinook-projects.aspx>